Draft Report

REGIONAL WORKSHOP
FOR
KEY PERSONNEL CONCERNED
WITH
OUT-OF-SCHOOL SCIENCE ACTIVITIES AND EXTENSION WORK FOR YOUNG PEOPLE

15th - 24th Oct.,1986

New Delhi

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and
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CHAPTER- 1

Introduction

Background

The Asian Centre of Educational Development, Unesco ROEAP, Bangkok had organised a workshop for key Personnel concerned with Out-of-School Scientific Activities by Young People in August 1982 in Bangkok. This was organised in collaboration with the science society of Thailand. This workshop recommended the development of a Training Handbook for Key Personnel Organising Out-of-School Scientific Activities. This handbook was developed by a team of authors identified by the National Council of Educational Research and Training (NCERT) New Delhi, India. NCERT was also requested to organise the Regional Workshop for Key Personnel Concerned with Out-of-School Scientific Activities and Extension Work by Young People in collaboration with Unesco Regional Office for Education in Asia and the Pacific, Bangkok. The workshop was held from 15-24 October 1986 at the National Institute of Education, NCERT, New Delhi. The work plan of the Workshop was developed in accordance with the Asian Programme of Educational Innovation for Development (APEID) Unesco activities for the year 1986.

Objectives:

The main objectives of the workshop were:

(1) To review the draft of the "Training Handbook for Organizers of Out-of-School Scientific Activities and Extension Work Programmes" developed at NCERT

(2) To review, analyse and synthesise current experiences of Out-of-School Scientific Activities and Extension Programme by Young People in the region.

(3) To provide experiences for the key personnel concerned with Out-of-School Science activities with a view to develop a cadre of trainers who could in turn organize similar training programmes at the "National level in various countries of Asia and the Pacific region.

(4) To consider and develop outlines of follow-up national training programmes of Out-Of-School scientific Activities and extension work.

(5) To discuss complimentarities between Out-Of-School Scientific Activities and applications of learning in school within the context of contrived activities and hobbies associated with developmental projects and special activities related to extension work programmes.

Participation:

The workshop was attended by 11 participants, from Bangladesh, China, India, Indonesia, Malaysia, Nepal, Philippines Republic of Korea, Sri Lanka, Thailand and Socialist Republic of Vietnam. The resource persons for the workshop were drawn from Australia and Japan, Besides seven authors of the "Training Handbook for Organisers of Out-of-School Scientific

Activities and Extension Work also participated as resource person. In addition Specialist in Technical and Vocational Education, Asian Centre of Educational Innovation for Development, Unesco Regional Office for Education in Asia and the Pacific, Bangkok participated in the workshop, This list of participants is given in Annexure I.

Inauguration:

The workshop was inaugurated by Prof. M.M. Chaudhri, Joint Director, Central Institute of Educational Technology, National Council of Educational Research and Training, New Delhi India on the forenoon of Wednesday, October 15, 1986. Prof. Chaudhari emphasized the need to extend education, especially science education beyond mere transmission of knowledge. He observed that in order to cope with the knowledge explosion in science and technology it is imperative that education should b. such that it provokes thinking, develops- the skills of acquiring new knowledge, inculcates habits of learning by doing and ultimately helps to develop creativity. It is really a difficult exercise and perhaps the formal system of education alone may not be able to achieve this objective. Out-of-School Activities may play an important role in this endeavour. The Out-of-School Activities may be promoted through active participation of school systems, museums, community, media and the like. For the success of Out-of-School activities it is essential that

they should be attractive enough to sustain the interest of participants. The activities ought to be interactive and participatory in nature. This has been our experience in India in various projects undertaken for popularisation of science through the involvement of the community. The NCERT has been promoting Out Of School activities by organising and sponsoring science exhibitions and developing educational television programmes. Ideas generated through such efforts need to be multiplied. The success of an Out Of School activity may not be judged only by the quantum of information it has provided but it has also to be seen how much it has helped to trigger off a desire in the individuals to tryout the ideas themselves. The lack of resources may be one of the main constraints in implementing Out Of School activities in science, Therefore the programme should aim at training personnel who may develop and utilize low cost equipment and exploit local resources in conducting the activities for the popularisation of science. He cautioned that often. the training programmes tend to train people without providing opportunities for practice in real situations. Wishing a success to the deliberations of the workshop, he hoped that this workshop would provide some experiences for hands on activities apart from discussion on theoretical aspects of training.

The inaugural function was presided over by Dr.M.Derkatch, Director, Unesco Regional Office, New Delhi. Dr.B.Ganguly

Head of the Department of Education in Science and Mathematics, NCERT, New Delhi welcomed the participants. The background and objectives of the workshop were introduced by Dr.M.A.Qureshi, Specialist in Technical and Vocational Education, Unesco, Bangkok. Dr. (Mrs.) S.Bhattacharya, Department of Education in Science and Mathematics, NCERT and Coordinator of the workshop gave the vote of thanks.

Officers of the workshop

The participants elected the following officers of the workshop in the first plenary session:

Chariperson: Mr. Ibrahim Noh (Malaysia)
Vice Chair persons: Mr.Daman Ali Dirgen(Bangladesh)
Miss Chen Yan (China)

Rapporteurs: Mrs. Anna Amerila (Phillipines)
Mr. Boonreong Keosard (Thailand)
Mr. U.A. Premaratne (Sri Lanka)

Venue:

The workshop was held at National Council of Educational Research and Training, New Delhi, India.

Method of Work:

The participants from the various countries of the region were requested to prepare a status report about out-of-school scientific activities in their respective countries for presentation at the workshop.

After inauguration and the election of the workshop officers, approval of the agenda (Annexure-II) and the provisional schedule of the work plan was taken up (See Annexure II for detailed programme). The next four sessions were devoted to the presentation of country reports by each participant. Each presentation was followed by a discussion.

The authors of the handbook presented the philosophy, broad-outline and the content of each chapter in five plenary sessions.

The participants were divided into three groups (Annexure IV) to examine critically each of the chapters and suggest appropriate amendments for overall improvement of the draft manuscript.

Miss Patricia McDonald, Head, Education Division, Australian Museum, Sydney presented a paper on "Out-of-School Science Activities at the Australian Museum, Sydney". A lecture on "ScienceEducation Activities for Youth in Japan" was delivered by Dr. Jiro Tanaka, Curator of Botany, National Science Museum, UNO Park, Taito-ku, Tokyo.

The participants of the workshop went on field trips to the National Museum of Natural History, New Delhi and Lodhi gardens, New Delhi. These field trips were arranged to expose participants to various field situations which could be utilized to develop out-of-school scientific activities.

They were also briefed by Miss Patricia McDonald before the field trip. Experiences of these field trips were discussed and a report based on that was presented. A hands-on experience on developing some out-of-school science activities like discovery boxes, was also given to the participants.

A draft report of the workshop and modifications suggested for the training handbook were adopted in the last plenary Session. The groups also put forward some recommendations for consideration by Unesco and the governments of the participating countries.

Dr. S,M. Nair, Director, Natural History Museum, New Delhi was the Chief guest at validictory session on 24th October,86

Report and recommendations of the workshop were presented to the house during this session.

CHAPTER - 2

Highlights from Country Reports - Overview, Planning, Implementation and Evaluation

This chapter contains summaries of the reports provided by the participants attending the workshop. Their subsequent review and discussion on methods of planning, implementation and evaluation of out-of-school science activities in their countries are given below.

AUSTRALIA

Australia has 8 autonomous, separate education systems in the 6 states and 2 Territories that make up this very large country of 15 million people. Science resources in the schools and the colleges are generally considered to be good following an expansion of facilities over the last few years. Out-of-school education methods do not differ a great deal from these used in the school system. The chief avenves for out-of-school science education activities are :

Centres for Science Education

Into this category would come applied science and natural history museums, science and technology centres, national parks centres, zoos, botanic gardens and forestry centres. These organisations employ trained teachers to plan and operate educational science programmes, for both school groups and out-of-school activities, of great variety and range of complexity, e.g. field studies, hands-on activities work sheets,

displays of students' work, special course, lectures, film shows. Many of the field studies centres, either in national parks or in other state-owned or privately-owned land, have provision for overnight accommodation for students, while others allow camping on their land. Many of these centres use volunteers from the community to assist with the programmes. Funding for the programmes comes from many sources - Federal, State or local government, private sources, the community itself. Evaluation is an integral part of most programmes.

Support Organisations

Many government departments provide support and advice for those agencies operating out-of-school activities. Departments such as Nuclear Energy, Mining, Wildlife, Fisheries, etc. produce films, video and printed materials of many kinds which are issued free or at cost. They also provide lectures for seminars and training courses.

Private organisations are also very supportive. These range from international companies to small local firms which provide funding and support similar to that stated above for government support. There are also national, state and local groups from the community such as Science Teachers Association, Conservation Groups and specialised scientific societies, as well as Rotary, Lions and other civic clubs.

A special mention should be made of the correspondence schools and the school of the Air for those students who live in isolated places in our vast country. The production of Science Films, videos, kits, travelling exhibitions and publications is of immense benefit to these isolated children as well as to those living in urban or rural environments.

Some Special Out-of-School Activities

Work experience for students nearing the end of their school studies involves the students in working for a short period in science industries or colleges, museums etc. This is intended to give them some idea of the working environment and its possibilities for a future career in science.

Handicapped students can study in special centres or be provided with materials in their own houses. Visits to science centres are often arranged for the handicapped.

The use of teen-age volunteers in science centre is being developed, e.g. at the Discovery Room at the Australian Museum. Students can gain experience in communicating scientific principles and knowledge to other members of the community.

Finally, most of the above out of school activities are also available to the community at large. Organisations like the Workers Educational Association, evening colleges, technical colleges and many private organisations provide science related courses, field trips, publications and so on, for those who have left school.

BANGLADESH

Overview

Bangladesh covers an area of about 140,000 sq. Km. with an estimated population of 100 millions. More than 80% of the total population lives in rural areas and the rate of literacy is about 27%. Its economy largely depends on Agriculture.

The Government of Bangladesh is fully aware of the problems with which the country is confronted. The Govt. is engaged in a massive attack through educational developments to eradicate illiteracy, poverty and other factors which stand in the way of achieving self-reliance and the desired objectives. Bangladesh is lacking qualified and skilled personnel in various sectors of the economy and that is why imparting of science education has been given top-priority in our country.

Planning

This is the age of science and it is in this context of realization that our education policy emphasizes amongst other objectives, the introduction of science and vocational courses in schools. Education both formal and non-formal must produce skilled man power relevant to the developmental needs of the country.

The importance of providing teaching-learning experiences to the individuals in the community for improvement and enhancement of scientific knowledge, skills and experiences is recognised

at the National level. Projects have been launched involving science and Technology, teachers, teacher educators, parents and community to give rise to an educational process, which is functional and related to the environment, culture & traditions and vocations of the people in the community. Drop-outs in school level are also high and steps are being taken to train them in vocational schools.

Status of Science Education in Bangladesh

(i) Formal Education

The education policy of Bangladesh has attached much importance to science education. There has been a change from science education for an elite to a search for more appropriate and effective ways and means for the delivery of scientific knowledge, skills and attitudes to various groups in the community and make it more relevant to the needs of larger sections of the school population.

At the primary and junior secondary level, the main objectives of science are to develop a spirit of curiosity and awareness about nature and the environment. Science at these levels is taught as an integrated subject.

At secondary level science education continues to be academic and subject oriented. Science at this level also is taught as an integrated subject.

(ii) Out of School Science Education

The infrastructures for the delivery of out of school science education are generally not available. Such delivery systems are likely to be socially and culturally specific. Bangladesh can not afford to have an independent out of school system and closer links between the formal systems are, therefore, essential. These links must ensure that the community is actively involved in identifying its own needs and that the talent is mobilised to meet those needs.

Implementation

In order to popularize and implement such programmes a 'movement' is to be started at the National level. Adult illiterates in Bangladesh form a major segment of the population. Scientific knowledge in an appropriate form could be incorporated in the reading materials by which literacy could be promoted. The development and provision of teaching and learning materials in the non-formal system is minimum and therefore the teaching-learning materials of the formal system are used. In the general aspects of non-formal education there is some development of materials on an ad-hoc basis in the form of books, posters, films and radio programmes for the popularisation of science.

The main target groups for out of school education will include :

i) The out of school children and youth including those who should have been in schools under the universalization of education process.

ii) The work force including the vast number of illiterates.

iii) The educated adult section of the population.

Institutional infra-structures

The delivery of science education to out-of-school youth does not exist in a real sense in Bangladesh at present. However Bangladesh Educational Equipment Board (BEEB), the Science Museum Bangladesh Betar, Bangladesh T.V. BIDE Science Clubs, various trade schools, community centres may play a vital role in bringing success to non-formal education development.

The issues and problems have been raised in the original country report and the recommendations have also been placed for consideration.

The out of school activities are more effective for the drop-outs and the vast illiterates which form the major section of the masses. These give opportunities to work together and to come in contact with various cross sections of the people. The Govt. should come forward to launch such a movement which may help in solving so many social and economic problems.

CHINA

Overview

A National leading group for Young People was formed in June 1981.

The group, composed of leaders from China Association for Science and Technology, the National Committee of Education, the Central Committee of the Chinese Communist Youth League, the State Physical Culture & Sports Commission and All China Women's Federation, has its headquarters at the China Association for Science & Technology.

Planning

From then on associations of childrens science instructors were established in various parts of the country. Their members totalling over 400,000 are a backbone force in organising scientific and technological activities.

Implementation

To date there are about 8000 children's palaces children's homes, children's activities clubs, Children's Science & Technology Halls, Children's Science and Technology Centres attached to educational departments, the Communist Youth League Organisations the Women's Federations and Science & Technology Associations at various level. These are the major centres of entire curricular science & technology activities of children.

The main organisers of such activities are the associations of young science enthusiasts and the science hobby groups in and outside schools.

Under the 'Love Science Month' children are encouraged to read popular science books, do some experiments and acquaint themselves with the achievements of scientists and attend a populm science lecture. "Science Hobby Group's" organise activities to illustrate scientific qualities.

"Survey Camps for science enthusiasts provide opportunities to explore & learn about nature. Fairs of scientific work are arrange.

From 1981 one time contest of Younger's small inventions small products and small works will be held by the National leading group two years.

INDIA

Overview

Approaches developed in the last 3 decades to meet the challenge of educating overwhelming masses of this country living in various socio-cultural & economic backgrounds are numerous. There are governmental, non-governmental educational & social and political organizations involved in the task of creating an awareness towards the surroundings of man, questioning it and changing it, among the people of this country which in simple words is known as creating scientific temper or popularizing science.

Among the governmental organisation there are various departments and ministries at national & state level which promote, fund and initiate various activities which fall in a broad category of out-of-school science activity.

The important departments are :

(1) Deptt. of Education (2) Deptt. of Science & Technology (3) Deptt. of Information & Broadcasting (4) Deptt. of Communication (5) Deptt. of Agriculture & Food (6) Deptt. of Health (7) Deptt. of Energy (8) Deptt. of Environment.

There are various agencies like National Council of Educational Research and Training, (NCERT), State Institute of Education (SIE) Indian Space Research Organisation (ISRO), National Council for Science Museums (NCSM) etc. which implement various programmes on behalf of the government.

e.g. NCSM runs various science museums and science clubs at various places in the country.

* NCERT over and above funding various other agencies run a number of science clubs and is involved in developing science centres, arranging various competitions, science fairs and media research.

* The Educational Technology Deptt. of SIE is mainly concentrating on developing radio and video programmes for out-of-school science activities for various members of the community, while the science department is involved in organisation of science exhibitions, seminars and clubs.

*ISRO developed the network of television which is being used for distant learning in the remotest villages of this country.

Each ministry or department has its own programme in the fields of Health and Nutrition, family planning, information and implementation about modern technology in agriculture, energy and other industries which also can be considered as out-of-school science activities.

Among the non-governmental organizations there are various voluntary agencies and educational institutes putting their efforts to bring about relevant changes in Indian society through the spread of scientific and technological innovation and proper adaptation suitable for the society. All these agencies are heterogeneous in value & have developed a number of approaches depending upon their ideological and physical backgrounds. Some of the main types of orgnization involve :

1. Science Centres

Vikram Sarabhai Community Science Centre, Ahmedabad, Nehru Centre Bombay, Balbhavan New Delhi, etc. can be classified under this category. The activities of these centres include :

- Participatory Science Exhibitions
- Science Clubs
- Science Playgrounds
- Open Science Laboratories
- Developing the low cost teaching materials

- Producing popular science literature and audio and video programmes
- Trying out various forms of performing arts and other means to popularize science among various members of the community.

2. Science Movements .

The major movements of India in the field of science were initiated by Kerala Shastra Sahitya Parishad Bhopal Guskand Morcha and Chipko Andolan. These movements include an awareness of general science and information about our surroundings to an issue based on mass protests for a prolonged period and creating an intensive sensitization towards issues such as pollution of any river, deforestation due to indescriminate cutting of trees, destruction of natural environment due to so called developmental projects etc.

3. Educational organizations which provide either support structures or extension and improvement in the formal system using various out-of-school activities.

The important schools working for this cause are Hoshangabad Science Teaching Programme (HSTP) and Homibhabha Science Centre, Bombay. The former institute has developed an alternative curriculum suitable to Indian conditions for middle school science and implemented it successfully in a few districts of M.P.

The latter group has pioneered in developing an alternate strategy for overcoming the language disabilities of first generation learners coming from backward socio-economic backgrounds.

Planning and Implementation

As far as the Governmental programmes are concerned planning takes place at the central level. Each five year plan decides the priorities of the nation for the next five years. Based on these each department & ministries chalk out their own programme for each financial year and make the budget allocations for the same.

For the voluntary agencies the process is just reversed. They operate at local level and hence decide their priorities, target groups and mode of operation depending upon their own interest, capabilities and resources. Then, either they approach various governmental and voluntary (Indian, or foriegn) or charitable agencies for funds, or they generate their own funds through auxilary or supportive activities.

From centre down to the district, block and village level there is a net work of various governmental bodies which implement the programmes decided at the centre. The plan for implementation of voluntary programmes is decided by the agency itself.

Evaluation

Evaluation of Governmental programmes are done according to the criteria based on various success parameters. The statistics collected for each programme are analysed and conclusions are drawn from them.

Voluntary agencies are evaluated by the criteria decided by the respective funding agencies. Most of these programmes have both inbuilt and external systems of evaluation.

INDONESIA

Overview

In order to develop and to enhance the scientific community and to increase scientific awareness of the people, as a realization of two of the functions of Indonesian Institute of Sciences, we develop Youth Science Clubs (KIR-Kecomok (Gniah Remaja - the members are young people between the age of 12-21 years old).

The young people have a strategic position because of the large number of them; their natural youth responds openly to something new and they could absorb it easily. So, they are potential human resources for our national development and they are motivated to be a cadre of Science and Technology manpower in the future. Therefore we have to motivate them to use their leisure time for beneficial activities, beneficial for themselves, for society around them and for the nation.

The youth science clubs are selected to be organizations for popularization of science and technology because firstly, formal education, generally, has little opportunity to catch up the rapid growth of the facts of Science and Technology; secondly, the young people often show their personal identity by doing activities which do not always have positive impacts, fruitfully for developing their personality and for their society. It is often the young people who make trouble for the society (juvenile delinouency) and thirdly, continuity of the activities of out of school science education for the young people could be achieved through organizations in which its members consists of young people who have the same hobby, interest, idea and purpose.

Planning

The objectives of the development of the Youth Science Clubs by Indonesian Institute of Science are to stimulate the young people to pay attention to scientific activities; to enhance their creativity; to develop and to increase their knowledge and skills in research and technology which will be useful for further/higher education (formal education) and for the job seekers (non formal education).

All of those activities are planned to catch up with the needs of young people for our national development related to the Five Year Development Plan. The plan has to be approved by the Indonesian Institute and then, it has to be approved by

the Government through a team which has been formed, consisting of staff of the State Minister for Research and Technology, Ministry of States Secretary, Department of Finance and National Development Board (BAPPENAS). After being approved, the plan is put to the project for popularization of Science and Technology which conduct by Bureau of Popularization of Science and Technology, Indonesian Institute of Sciences, and funding by Indonesian National Development Budget.

Implementation

The implementation of the project is started after the fiscal year (on first of April) and has to be finished on 31st March, every year. Usually, the conducting of the activities such as methodological research training, management of Science Club's training, science fair are held in the school's vacation and lectures, discussion etc. are held in the afternoon (after teaching class hours) or in holidays.

Evaluation

The evaluation is conducted through the amount of participants of science contest, science fair, rising demand of the young people to attend or to have science clubs, training courses, lectures, discussion etc. and also through the growing enquiries via letters.

There is another evaluation of out of school activities such as science contest and illiteracy eradication. These are carried out by the Department of Education of Culture.

KOREA

Overview

In Korea scientific contests such as science, mathematics, model air plane production and flight, model car race, science fair, educational materials fair, invention, science box building, radio making, computer and research contests are held every year. During the vacation students collect insects, minerals, and other scientific materials, research make field-trips, and make astronomial observations while camping out.

However while there are many kinds of activities available excellent students do not participate in these activities, so these activities are not positively put to practical use.

The following may be the reasons :

1. The competition to enter in school or college is too hard to give them spare time for such activities.
2. The lack of facilities
3. The lack of organisations and leaders
4. The lack of motivation among students and teachers.

Planning

To solve these problems, Seoul Board of Education devised a special program named 'Science Garden'.

Selected students are chosen in every school and are rewarded through allowing them to take part in the program. These students are recommended by their school principal. The

program's curriculum involves such items as lessons focused on experiments, special lectures on science, science workshop, camping, field trips, exposition of facilities related with science, watching science films and science show, etc.

Implementation

This year systematically designed science programs were conducted for the representative students who were selected through competition and were recommended by the principals.

3,100 primary students and 2800 middle school students participated. They were trained at the schools which had superior facilities for science experiments than other schools. Well trained teachers were chosen to train them. Small groups were formed, and excellent teachers were involved to cater to the needs of the distinguished students and the programs were well attended.

Evaluation

Teachers, students and parents all gave a favourable response to this program and wanted it to spread further so that many more students could participate. Next year the high school students will be allowed to take part. This program is carried out as one of the programs so as to educate scientifically talented students.

The Board of Education has increased the financial assistance 100% from the next year, and the new program is under plan now.

MALAYSIA

Overview

Out-of-school scientific activities in Malaysia are essentially school based. Very little has been done for the young people who are no longer in schools. This is because the majority of the young people under 18 years old are in schools.

These activities are organized at school, state and national levels. The organization at the national and state levels are aimed at stimulating the schools to carry out these activities, which are done by the science and mathematics clubs, the electronic club, the computer club and other clubs oriented toward the sciences. Among the activities that have been organized are talks, quiz, essay writing, visits, camps, fairs, exhibitions, small study of the environment computer programming and small invention works.

Planning

Planning of the activities is done one year in advance, as the budgets are to be submitted to the sponsors a year ahead of the implementation. Planning includes :

a. identification of the target group

b. identification of aims, objectives and theme

c. determination of place, date and time at which the activities have to be implemented.

d. determination of the person to inaugurate the activities.

e. determining the network of the tasks to implement the activities and hence the schedule of work.

f. budgeting the expenditure.

The draft of the plan is prepared by the secretariat and then presented to a committee for finalization and endorsement.

Implementation

The secretariat and the above committee constitute the main committee responsible for all decisions regarding the activity. To implement the decisions, three phases are involved.

a. dissemination of information and decisions to schools is done by the science officers at the state level who receive instructions and guidance from the main committee.

b. production of exhibits or other forms of project works are carried out by the schools.

c. displaying to the public can be done at the schools, states as well as national level.

Evaluation

The main committee forms a sub committee in charge of evaluation works. Evaluations are in the form of questionaire forms, interviews as well as engaging experts to judge the products obtained. Reports will be presented in a special meeting after the activity has been fully implemented.

NEPAL

Overview

Nepal is a mountainous country with diverse problems. Science education is one of them. More than 20 per cent of Nepalese children do not go to school. The illiteracy rate is also high among the adult population. It has therefore become imperative that along with formal science education out-of-school science teaching activities be launched on a larger scale in order that a wider section of the community can be benefitted.

Planning

As mentioned above formal education alone will not be able to educate the rural mass, so careful planning should be carried out. First the target group should be identified. Second, ther needs should be identified.

1. Target Groups and their Needs

(a) Students of formal education system prescribed curriculum does not include many aspects of science relevant to daily life. Therefore out of school activities will enrich their science knowledge at the same time will create interest to take up science in future.

(b) Out-of-school children, dropped-out students should have knowledge of science and technology relevant to their daily life.

(c) Adult members of community : Both the young and adult members of the community need to have knowledge of science and technology relevant to their daily life and their jobs.

Implementation

There are various agencies involved in carrying on out-of-school activities in Nepal, a few of them are listed below.

1. Royal Nepal Academy of Science and Technology (RONAST)

Established in 1982, RONAST is involved in following activities :

(a) Science Exhibition
(b) Quiz Contests
(c) Prize programme

2. Research Centre for Applied Science and Technology (RECAST)

Established in 1977. RECAST is a research organisation devoted to the development of appropriate science and technology for rural area.

3. University Campuses

Many Campuses arrange science exhibitions which attract both school students and out of school youths. Recently Dharan Campus of Eastern Nepal has taken an active role to popularize science and technology by providing training to house wives and arranging exhibition.

Natural History Museum

The museum was established in Kathmandu in 1975. It plays a prominent role in educating students and general people in the field of conservation, flora, fauna and geology. Beside Kathmandu, Pokhora also has such a museum.

Science Education Development Centre (SEDEC)

Established in December 1983, SEDEC plays a vital role in developing science and scientific activities in the country. On the formal side, it provides (a) training to 3800 teachers (b) science equipment to the schools (d) produce teaching and instructional materials. Beside, these activities it will have 25 resource centre at 25 distincts of the kingdom. These resource centres can be located for out of school activities.

Besides the above mentioned organisations several other governmental, non-governmental and UN agencies are engaged in regularly or occasionally disseminating science knowledge to the rural man.

Most of the activities to popularize S & T at rural areas on occasional basis has become futile. Therefore a permanent type of activities with careful planning should be done for future. Some of the problems and recommendations are given below :

Problems

(a) lack of resources

(b) lack of coordination among different organizations

(c) duplication of activities by different organizations

(d) lack of trained manpower for production of materials and literature.

Recommendations

(a) provide training and equipments to various organizations involved in such activities.

(b) bring coordination among the organizations.

(c) establish resource centres at schools and involve science teachers to educate rural mass.

(d) curricula of literacy programme and primary level should contain maximum science and technology component in relation to real life situation.

(e) open more science clubs.

(f) T.V. and video sets should be provided to the rural community.

(g) scientific, agricultural, industrial and health exhibitions or fairs should be organized on a regular basis.

(h) rural mass should be encouraged to visit and adopt the new ideas.

PHILLIPPINES

Overview

One of the continuing thrusts of the Phillippine Government is the advancement of science and technology (S&T). The benefits of S & T are to be distributed equitably to the greater portion of the population, the majority of which live in the rural areas.

The Science Promotion Institute of the National Science and Technology Authority is charged with the responsibility of

promoting the public understanding of Science and Technology. With the growing concern for the improvement of rural life, the SPI, in collaboration with other Government agencies, continues to deliver alternative educational delivery services to the rural poor.

Planning

The out-of-school science education laboratory (OSSEL) was planned at the central office level in collaboration with the Science Promotion Officers of the twelve geographical regions of the country. The needs and problems of particular regions were identified and specific project plans were drawn up. Linkages with other government and non-government agencies were formed. Resource and skills were listed and budgetary requirements assessed. An environmental scanning survey was done as a tool for testing the viability of regional project proposals.

Implementation

A pilot project was implemented in one region near the Central office. The choice of this region is based on accessibility for fermative evaluation. The project group was given a seed money of 6000 pesos ($ 400 US.). After a year of project implementation, with the results of evaluation the project was implemented in the 11 (eleven) other regions. The core person conducts the project in his region.

Evaluation

The context input-process product (CIPP) evaluation model was used for evaluation. Indicators were identified and analysis interpretation of the data was done.

SRILANKA

Overview

Sri Lanka is an island situated in the Indian Ocean. The population is 15.6 million. There are 9914 schools with a school going population of 3.625. 897. The present education system in the country consists of three levels which covers a span of thirteen years.

1. Primary level of education - years 1-5.
2. Junior Secondary level - comprising two cycles from years 6-8 and years 9-11. The years 9-11 component is tested at the G.C.E. O. Level examination which is also a selection test for the senior secondary level of education.
3. Senior secondary level years - 12-13.

Science education begins at years 4. There the curriculum is based mainly on activities and the children begin to appreciate the enviornment. Then in years 6.11 there is a separate subject which is compulsory to all students - science. In the senior secondary level students are streamed into three areas: science stream, art stream & commerce stream.

Planning

There are so many organisations involved in out of science school activities. Schools, field centres, science education support centres, Sri Lanka Association for Science and Mathematics Education (SLASME) Sri Lanka Association for the advancement of Science are some of them. In addition to the above organisations, there are volunteers & other organisations which are in some way involved in out of school science activities, e.g. National Housing Authority, Thahawali Authority. Central Environmental Authority Institution of Fundamental Studies and Forest Department.

Implementation

School Science Clubs are formed in all schools teaching science and they conduct essay competitions. Do you know contests, prepare Herbaria, School Botanical Gardens & Medicinal Plant Gardens. Field trips are arranged and also they help to improve the health standard of the community.

There are seven field centres and in these centres project work, seminars and nature trails are available.

There are three Science Education Support Centres in the country in Peradenia. Hali ela and Anuradhapura. Perademiya centre covers the whole country conducting in service seminars for the teachers. In these centres we do project work, maintain nature diaries, do nature trails & improvisation of apparatus.

The teachers as well as students come to these centres. We must improve these centres to cater to large numbers.

Sri Lanka association for science & mathematics education and Sri Lanka Association for the advancement of science are national bodies. They attempt to involve quite a lot of people in the out of school science activities.

In achieving the target we have encountered a lot of problems. The school syllabus is exam oriented and hence the students are reluctant to take part in out of school activities. Most of these projects are time consuming and there are no incentives in the form of recognition or otherwise.

If we can overcome these problems there will be lot of young people involved in Out-of-School Science Activities.

The Curriculum Development Centre in collaboration with the Unesco conducted a National workshop on Out of School Activities from January 13-17 and that workshop was a very big success. We hope such a workshop will be an annual affair. During the last decade involvement of young people in out of school science activities has increased rapidly and as a result science literacy has been promoted among young people in the country. In addition to these, mass media television and radio magazine give a wide publicity in this field.

Evaluation

Little formal evaluation has been carried out. Programmes are monitored and changes made as seems appropriate to make them more relevant to the target group.

THAILAND

Overview

In the past, the out of school activities in Thailand had been used to supplement the school syllabuses. The main activities namely science clubs, science camps and many form of science competition were organized after school hours. Some activities, namely exhibition, science corner science projects were integrated in the normal classroom teaching. And the numbers of students who were interested in science was very satisfactoryly high, the top students entered into universities in the field of sciences. But at present the condition for scientist recruitment in Thailand appears somewhat pessimistic because there is a strong tendency for high school leavers with scientific potential to choose not to further their studies in the Faculty of Science. Under this circumstance, a great many scientists, teachers educators and administrators have begun to realize that the need to wake up the interest for science and technology of the youth as well as of the public should be aroused. It was suggested to the Govt. that a National Science Day be declared and the youth science week be a tool to stimulate as well as to evaluate the interest of youths and the public. Since 1982 the celebrating of the National Science Day has been organized as the Science Week held between 18-24 August and due to its success, the science week has been annually organized ever since.

Planning

In an attempt of achieve such goals and to strengthen the school syllabuses, the out of school science activities have been organized nationwide and the youth in school as well as out of schools can take part in such undertakings. The Science Society of Thailand has been selected as the Coordinator; the Ministry of Education, Ministry of Science and Technology, the Universities, Schools Science Museums, Educational Research Institutions are the implementers. And the private sections such as Shell Co of Thailand, Caltex Co., the Cement Co., Commercial Banks in Thailand are the supporters. And to make sure of the continuation of the programmes, the budget plan has been made for three years in advance.

Implementing

Within this framework the project implementation aims at decentralizing organising units so as to include as many grass-root agencies as possible. By so doing, participants' working from smaller units are carefully selected to become part of the activities organized by larger units until they reach the national level, at the top of the scale. The Ministry of Education serves as the implementing agency in organizing various science activity contests and competitions including selecting certain outstanding achievements which deserve winning awards for each year. The Ministry of Education has successfully carried out its tasks and obtained the desired objectives via its hierarchical system the grass-root unit of

which starts from schools, moving upwardly to school clusters, provinces, regions and the national level respectively. For certain activities the universities, museums and institutions undertake a task of screening outstanding works at geographical region level as well.

Evaluating

The National Science Week is a part in the project scheme to evaluate the success of the programme. The activities of many forms and many levels have been integrated into one national event namely - selection of senior scientists, selection of outstanding scientists, outstanding science teachers, the most outstanding science research projects from all regions, and all research evaluation committees conduct their task and report to the Organizing Committee.

VIETNAM

Overview

Scientific and technological development helps not only to eliminate poverty and backwardness but also shortens the period of socialist reconstruction. Promotion of Out of School Science Activities is necessary and indispensable and these should be linked with national practical situations.

Implementation of Activity "Creative Competition for Young People" is being organized by Vietnam Communist Youth Union in

co-operation with other mass organizations institutions, like science exhibition, popularization of science through media, competitions, museums etc. Scientific activities for the university students are imbued with the spirit of "turn the training process into self training process". There is a bulletin "Mathematics & Youths" with useful alternative contents to young intellectuals.

The teaching aid producing movement has yielded results. Vocation oriented centres are preparing society as a creative labour force. Study and work system schools where students can study and work together are funded by local people.

Experiences

1. Attention is paid to psychological factors of youth to achieve effectiveness and efficiency of out of school scientific activities.

2. Activities should improve the life of youths otherwise they may dislike to take part in them.

3. There should be training courses for scientist, educators.

CHAPTER - 3

Review of the Draft Training Handbook for out-of-School Science Activities and Extension Work

The procedure for review of the Handbook was as follows. The salient features of each chapter was presented by the author. This was followed by a general discussion. The participants then divided into three groups (Annexure IV) and examined the chapter in detail. The findings of the groups were presented in a plenary session. The proceedings are summarised below chapter wise.

Two major recommendations were that the manual should have an Introduction to the Handbook which will describe its salient features, use and certain terminology used in the text may be clearly defined. The other was the inclusion of the objectives of the chapters at the beginning, and to include a paragraph at start linking it to the previous chapter.

Chapter-I Overivew of out-of School Scientific Activities

Prof. B. Ganguly detailed salient features of this chapter and also the main theme behind it. It was discussed in the house in detail. A summary of discussion following the presentation is given below:

1. Decision making ability must exist at macro and microlevels. It should also be individual as well as collective.

2. The qualities of implementing agencies and persons are voluntary participation, tolerance, leadership, qualities like forwardness and honesty etc.
3. People educated through the formal system often forget their links with the common people and society. Out-of School Scientific activities can never produce such a type of persons.
4. In almost all the countries of Asia there exists a large section of population, who are living in severe conditions. The conditions of these persons must be improved immediately. The out-of-school scientific activities is very beneficial to these persons ie large masses of deprived persons.

The topic is of general issue dealing with several basic issues concerning out-of-school activities therefore , the discussion was also focussed on basic issues like rationale, problems, constraints etc.

After the discussion, three groups of participants were formed. To each group, at least one resource person was attached. Each group came out with some recommendations. A summary of the suggestions and recommendations is given below.

1. This chapter should have objectives which are given below.
   (1) To make the reader aware of the problems/ constraints of the formal learning activities

and thereby the need for complementary and supplementary learning through out-of-school activities in Science (OSSA)

(ii) To achieve an understanding of the concept aims and objectives of OSSA

(iii) To know the nature, scope and limitations of OSSA

(iv) To apprise the reader of the approaches and strategies to formulate OSSA.

2. The title "Advantage over the formal education system" be changed along with suitable modifications as " The constraints of formal education system and advantages of out-of-school scientific activities"

3. The entire paragrap has to be recast to accomodate the idea that OSSA is supplementary and complimentary to the formal education system.

4. Two sets of rationales have been given in the chapter. One set of rationale is on page 2 and the other on page 3. The rationales may be suitably merged to come under only one set of rationales.

5. Mention of country 's names should be avoided as much as possible.

6. A new point in rationale may be added. It is given below " OSSA have been carried out in many countries of the region. The gap between development of science and Technology and content of science taught in the school is widening. OSSA can bridge this gap"

7. Item No 6, 7 and 8 under rationale for developing out-of-sc school activities on page 3 may either be deleted or revised so as to avoid unnecessary comparison between OSSA and formal education system.

8. Item no 4 of Aim may be made more explicit and a new aim may be added as given below

   5 " Creation of a sense that science is fun"

9. Under limitations of OSSA on page 7 second sentence of para one and entire para no 3 may be deleted A new para may be included as given below

   " Due to presence of examination and its further implications, parents often do not encourage young people to participate in OSSA"

10. There were some suggestions for minor corrections and adjustments, which have been incorporated in the text.

Chapter-II Planning for out-of-school activities

Salient features of this chapter was presented by Mr. R.Joshi. He laid special emphasis on the following points, the need for planning, stages of planning viz, Planning at central level with a set of terms of reference for the central expert committee, provision in the national and state budgets, liaison with states, development of infra-structure of implementing agencies and communication channels, evaluation, planning at implementing agency level, planning for training the staff etc.

The chapter was discussed by the house after the presentation. A summary of discussions is given below.

There was a question regarding the needs of micro-planner. The idea was that the macro-planner may over look some of the essential needs at lower levels. It was suggested that the closer communications between the two groups could be more sensitive to the wishes of micro-planners. Some of the participants wanted to include representatives of micro-planners must be involved with macro-planning. The only apprehension in this case was that this may increase the size of the macro-planning group which may become too large. There was a comment that awareness for even macro-planners is essential . A few participants stated the problems and levels of planning in their countries. It was felt that such situations will always exist. The planning levels, strategies and modes will differ fromcountry to country.

Three groups of participants, came out with various suggestions to be incorporated in the text of the chapter, which may be summarized as under:

1. This chapter, like the previous one, must specifically mention the objectives of the chapter. Which are as under.
    (i) To apprise the reader of the concept, common needs nature and scope of planning for out-of-school Scientific activities.

(ii) To help the reader to formulate a functional plan for out-of-school activities in science for his own country.

2. The first section may be on the concept of planning, what is planning? Why is there a need for planning on the macro and micro-levels. What are the common needs in all countries of Asia which necessitate planning for out-of-school scientific activities.

3. Participatory planning should be explained. Various approaches/strategies in participatory planning to involve the target groups should be discussed in one section. The feed back loop needs to be clear.

4. An alternative model for carrying out out-of-School Scientific Activities is appended herewith to be included in the text.

5. Section on identification of target groups and implementing agencies should be shifted to this chapter from the next one.

Chapter-III; Implementation

Dr. (Mrs.) S. Bhattacharya presented the detailed content of the text "Implementation". This was followed by a general discussion on the content. Some suggestions wwre made from the participants during the discussion. A brief summary of suggestions are given below:

1. The house felt that the first target group i.e. " the formal school population" can be approached through the

school system itself.

2. The second target group i.e. out-of-school youth and adults having varying degrees of literacy" is so diverse and large that the task of setting up an implementation programme for this group will not fall within the scope of this hand-book. However implementation strategies for the group has to be evolved at the national level.
3. The awareness of scientific literacy is an important aspect that it is essential to tailor it according to the needs and aspirations of individuals. Specific programmes for this may be planned.
4. Even within one community, there may be many sub-groups with varying needs. The first step therefore, will be identify the needs of each sub-group.
5. It is essential to determine specific needs of the target groups. Methods to study needs, to develop rapport with the target groups and to understand ignorance of people towards existing problems may be evolved.

After the general discussion the three groups discussed the chapter separately and came out with a couple of suggestions which are summarised below.

The chapter III should have following objectives:

1. To appraise the reader of the various strategies/ approaches in implementing out-of-school activities

inscience.

2. To present broad guidelines of implementation which may be useful for all countries in Asia.

Following are the comments on specific topics:

1. Identification of target groups:- The pre-school population and drop-outs at early age may also be included.
2. Identification of implementing agencies - The characteristics of implementing agencies may be identified, change the last two lines of page 16 as " They should high light the socio-economic changes through Science and Technology"
3. A brief mention of orientation Courses, for implementing agencies may also be given, acluding when, where, what and how these courses will be organized.
4. One of the distinctive types of resource person will be the communication agent. This person should be able to communicate to the target groups in their own language/dialect.
5. Minor changes and connections have been suggested and duly incorporated in the text.
6. one of the groups has suggested an alternative model of Implementation and planning which is appended herewith.

[illegible] 4

Chapter-IV: Evaluating out-of-school Scientific activities

Dr. Manmohan Singh presented this chapter high lighting the following points.

General strategy for evaluation, strategies for evaluation of individual activities, why enquire, enquire what? (Focus evaluatar), enquire from whom? (Criteria of evaluation) enquire how? (using what approach) What is the right perespective of evaluation.

After the presentation of the chapter, it was discussed in open house, several suggestions were made. These are summarized as under:-

(1) The evaluation should be done jointly by the implementors and evaluators of outside agency.

(2) Financers may be interested in the cost benefit analysis.

(3 Since the three chapters are written by different authors, interlinking is necessary.

4) Example activity along with the outline of planning, implementive and evaluation may be given.

(5 Concepts used in chapter of evaluation may be simplified to some extent. It should be simple worded with simple examples for easy comprehension.

(6) The model of evaluation presented in the chapter is suitable for the planning and evaluation at the national level. This model is not suitable for the

evaluation of an individual activity.

(7) Evaluation by outside agency is recommended only when the cost benefit is being worked out. The evaluation normally should be built in with each activity.

(8) In some countries like Philippines and Indonesia, external and internal agencies are involved with the evaluation.

9) When there is an evaluation by an outside agency, some internal people must also be associated with it.

Later this chapter was discussed in the groups. A Summary of group reports is given below:

1. This chapter should have objectives
   (i) To introduce the reader to the rationale of out-of-school scientific activities as an interlink to other chapters and also the need of evaluation.
   (ii) To introduce the reader a basic enquiry approach of evaluation while trying to answer why, what how and from whom to enquire.
   (iii) To introduce the reader, the proper perspective of evaluation.
2. This chapter may be further substantiated with examples from activities mentioned in part II of the Training Handbook.
3. Diagnostic and remedial aspects may also be considered along with intelligence test suitable to assess cognitive gains.

(4) This chapter must be made easy by avoiding the use of difficult words.

(5) Specific linkages with need, nature methodology, and evaluation may be established.

(6) First few pages may be rearranged for maintaining continuity.

(7) First three chapters need to be interlined.

8) An over all comprehensive schematogram depicting the role of evaluation at planning co-ordination, implementation and input evaluation stages may be incorported This model was accepted by the house and it was decided that it may be placed along with planning chapter, instead of the evaluation chapter.

(9) Specific linkages with need nature and methodology was suggested.

Chapter-V: Special characteristics of certain out-of-school Science activities

This chapter was reviewed by the participants and resource persons individually and consolidated corrected manuscript developed.

CHAPTER - 4

Suggested Follow-up National Programmes for Implementing Out-of-School Scientific Activities

The participants were requested to suggest use of the training handbook and follow-up National Programmes. These programmes and plans are outlined below.

BANGLADESH

The infra-structures for the delivery of out of school science education are generally not available. Such delivery systems are likely to be culturally & socially specific.

Bangladesh covers an area of about 55,000 square miles having an estimated population of 10 millions. More than 80% of the population lives in rural areas and the rate of literacy is about 27%.

Bangladesh is facing serious problems i.e. problems of food, shelter and clothes which have been receiving priority action of the Govt. There is a serious shortage of adquate qualified and skilled personnel in various sectors of the economy. The National thrust is therefore focussed on universal primary education with particular emphasis on the development of cognitive skills linking education with employment, making science & technology a basic component of the education system.

National Institute of Education

The necessity for out-of-school scientific activities has arisen out of the fact that the formal education system prevailing in our country is not considered sufficient to meet the challenge of the explosion of knowledge. The scope of learning in the formal education system, as many of us feel, is limited in respect of the curriculum and fixed available timings.

In view of the constraints of resources, out of school activities could be carried out in the formal educational institutions. Re-arrangement for timing and engagement of teachers are to be made from the said school.

All teachers of science are to be given training and orientation about out of school scientific activities.

Teachers should be given some honorarium for doing this extra work.

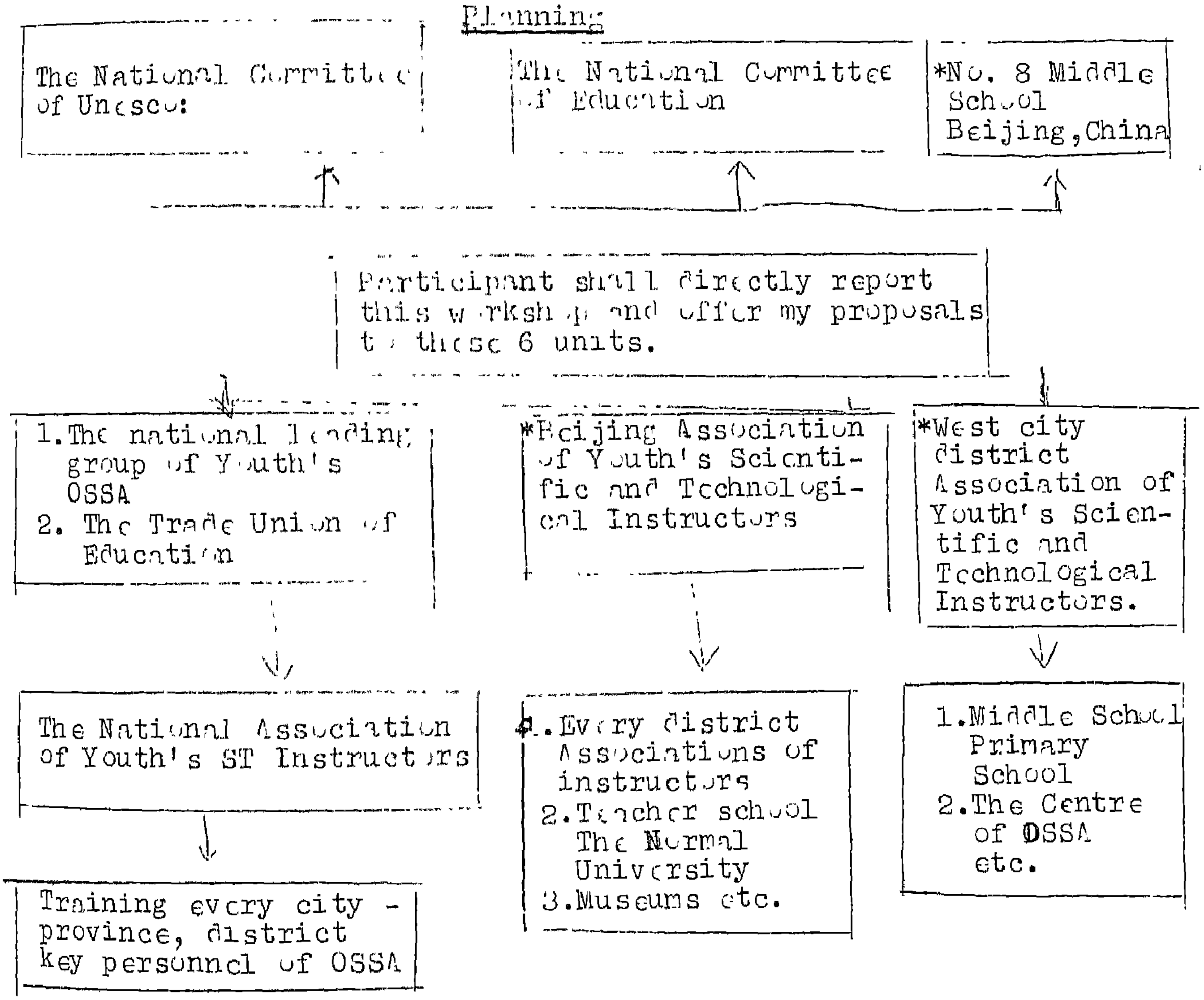
Since the science clubs, science fairs, exhibitions may play a vital role in propagating out of school scientific activities, such organisations should be given financial assistance and cooperation.

In order to create awareness amongst the youths at least four science museums may be established at the four divisional heads of the country.

The training of Key Personnel drawn from each district will be arranged for a duration of 10 days. These trained key personnel will conduct similar programmes for the people who are

actually implementing out of school activities in the districts e.g. people working in museums, science centres, science clubs, science school teachers, BLEB etc. The training hand book for organises of out of school scientific activities may serve the activities in our country after certain modifications.

CHINA



Planning

The National Committee of Unesco:

The National Committee of Education

*No. 8 Middle School Beijing, China

Participant shall directly report this workshop and offer my proposals to these 6 units.

1. The national leading group of Youth's OSSA
2. The Trade Union of Education

*Beijing Association of Youth's Scientific and Technological Instructors

*West city district Association of Youth's Scientific and Technological Instructors.

The National Association of Youth's ST Instructors

1. Every district Associations of instructors
2. Teacher school The Normal University
3. Museums etc.

1. Middle School Primary School
2. The Centre of OSSA etc.

Training every city - province, district key personnel of OSSA

Notes :- *Make three good examples in whole country. These three units are all advanced work units in our country.

INDIA

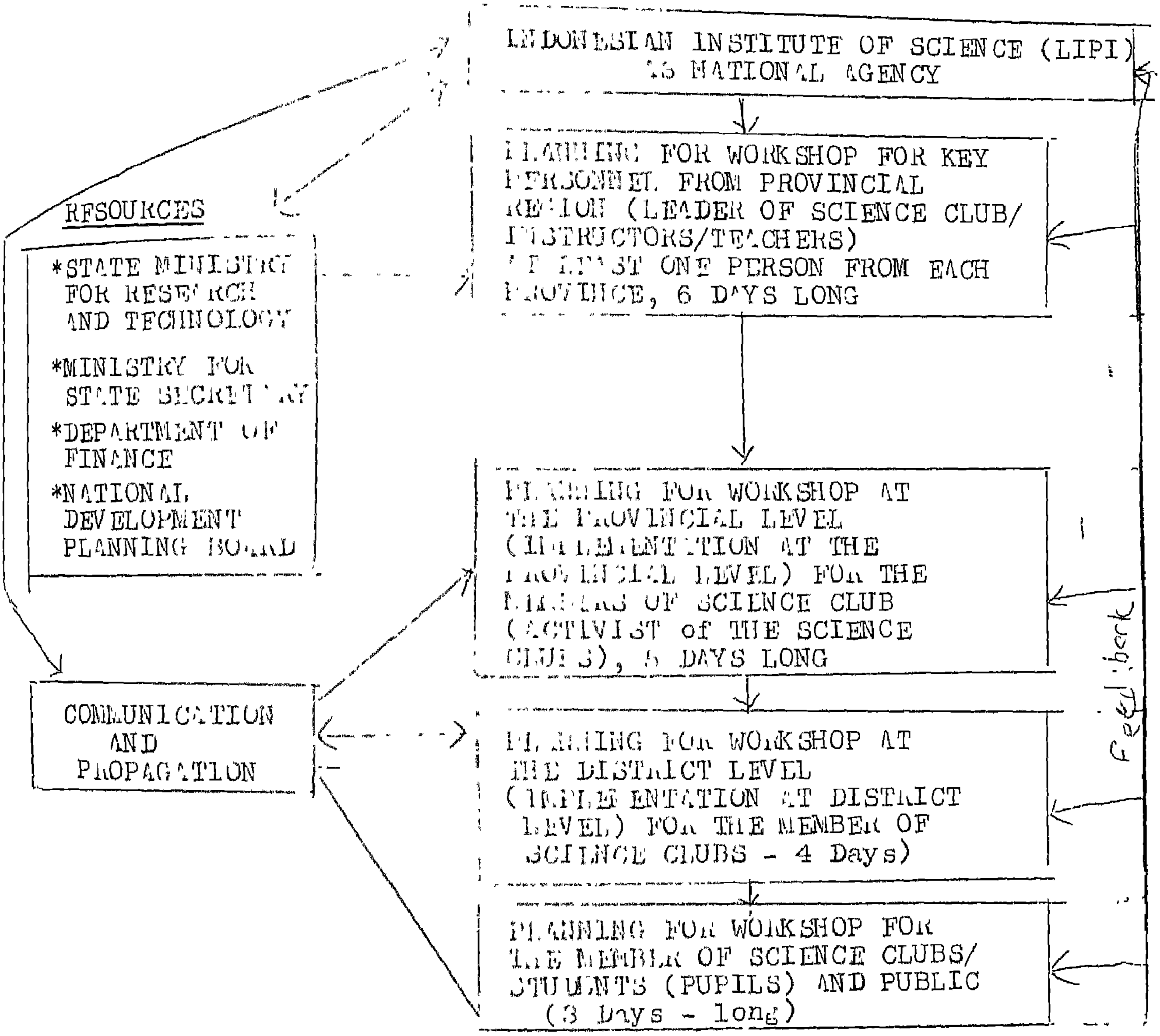
A workshop for at least 15 days may be organised at national level either by NCERT or any national body to orient the key persons, drawing at least one from each state/UT. They must be acquainted with the benefits of activities planned for out-of-school scientific activities.

The key persons in out-of-school scientific activities may organise a similar workshop at their state level drawing the persons from their various districts. The cooperation of the State Governments will be required. They should depute suitable persons for the purpose. Duration of training may be for 10 days. Expenditure may be borne by the State Governments.

In the same fashion the key-persons should train the implementing agencies at district level by organising a seminar or workshop for a minimum of 10 days. The activities must be devised and discussed fully to suit the local situations. The State Governments through their district machineries, must help the key-persons and implementing agencies in chalking out the future plan-of-action to popularise the out-of-school scientific activities. Interested teachers, headmasters, educationists and social workers along with the public relation departments at district level may be prepared to work as a bonafide implementing body of OSSA.

INDONESIA

Plan of Action


INDONESIAN INSTITUTE OF SCIENCE (LIPI) AS NATIONAL AGENCY
PLANNING FOR WORKSHOP FOR KEY PERSONNEL FROM PROVINCIAL REGION (LEADER OF SCIENCE CLUB/ INSTRUCTORS/TEACHERS) AT LEAST ONE PERSON FROM EACH PROVINCE, 6 DAYS LONG
RESOURCES
*STATE MINISTRY FOR RESEARCH AND TECHNOLOGY
*MINISTRY FOR STATE SECRETARY
*DEPARTMENT OF FINANCE
*NATIONAL DEVELOPMENT PLANNING BOARD
PLANNING FOR WORKSHOP AT THE PROVINCIAL LEVEL (IMPLEMENTATION AT THE PROVINCIAL LEVEL) FOR THE MEMBERS OF SCIENCE CLUB (ACTIVIST of THE SCIENCE CLUBS), 5 DAYS LONG
COMMUNICATION AND PROPAGATION
PLANNING FOR WORKSHOP AT THE DISTRICT LEVEL (IMPLEMENTATION AT DISTRICT LEVEL) FOR THE MEMBER OF SCIENCE CLUBS - 4 Days)
PLANNING FOR WORKSHOP FOR THE MEMBER OF SCIENCE CLUBS/ STUDENTS (PUPILS) AND PUBLIC (3 Days - long)
Feedback

The workshop would be conducted by Indonesian Institute of Sciences with assumptions:

- There is fund from Unesco and other funds
- some modification/adjustment can be done

There is a need to choose the priority of conducting the workshop because of the lack of resources.

I would like to suggest the implementation of such workshop in our country from provincial level, the lowest level, and also to establish the science clubs's network in Indonesia.

In order to foster the OSSA in South East Asia and Pacific, We'd like to suggest the establishment of an OSSA network too.

KOREA

The following programmes may be organised.

1. Workshop for Key Personnel (one from each province)
2. Activity leaders' workshop (province level)
3. Staff meeting of each activitics (city level)

Workshop for Key Personnel   13 Key Personnel   (1)
8 days

(plus resource persons)

(2)
6 days

Science
Mathematics
Computer
Science Centre
Radio
Airplane
Science box building

(3)
6 days

Primary school level, Middle school level, High school level, adult level

Handbook should be translated into Korean and used while workshop is held.

MALAYSIA

1. Centres of Responsibility

National level	Mathematics and Science Unit Schools Division Ministry of Education	Macro planning Instructing, Coordinating and monitoring Displaying to Public Macro-evaluation
State Level (14 States)	Mathematics and Science Officer State Education Department	Planning Instructing Motivating and Monitoring Evaluation
School Level (1109 schools)	Senior Science Teacher Senior Mathematics Teacher Teachers who are Advisors to Science/Maths. clubs.	Microplanning Instructing, Motivating and guiding Micro-evaluation Handling the product to Ministry.
Pupil Level	Pupils	Doing the project or activity Handling the product to school

2. Training

2.1 Ministry of Education will train the 14 state Mathematics and Science Officers at the national level, who will in turn train at the state level their respective senior science teachers, senior mathematics teachers and teachers who are advisers to science and mathematics clubs.

2.2 The curriculum of the training will involve the three phases or functions of managing out-of-school activities, viz planning, implementation and evaluation. The training mannual may be used with changes to suit the Malaysian situation. One important area is exposure to new developments in science and technology.

2.3 Duration will be 10 days. Money l have to be supplied for from the government under the In-Service courses scheme.

2.4 Participants will have to draw the activity network of their chosen programme and draw up the schedule of implementation using critical path analysis method.

2.5 The six or seven steps of evaluation will be introduced to the participants and they have to design evaluation instrument for each step.

Prior Experience

Mathematics and Science Officers at State Education Department are very experienced in running OSSA and this course will only act as a formalised procedure in carrying OSSA. However for the teachers, it will be new and will be of great benefit to them.

This course may expose them to new developments in mathematics and science education and will help them to guide the pupils to produce better projects,

4. Sources of Funds

4.1 Unesco (in fact letter has been received)

4.2 In-service Course allocation from the government.

4.3 RECSAM

4.4 Science and Mathematics Trust Fund of the Ministry of Education

4.5 Private sector sponsorship.

NEPAL

Nepal 's proposal to run a national workshop on out-of-school science activities has been accepted by Unesco and the fund for the workshop has already been received. The workshop will be held in December at Kathmandu on the basis of the proposal accepted by the UNESCO. However, the activities of the manual (New Delhi, Workshop 1986) will be incorporated.

Following is the programme plan.

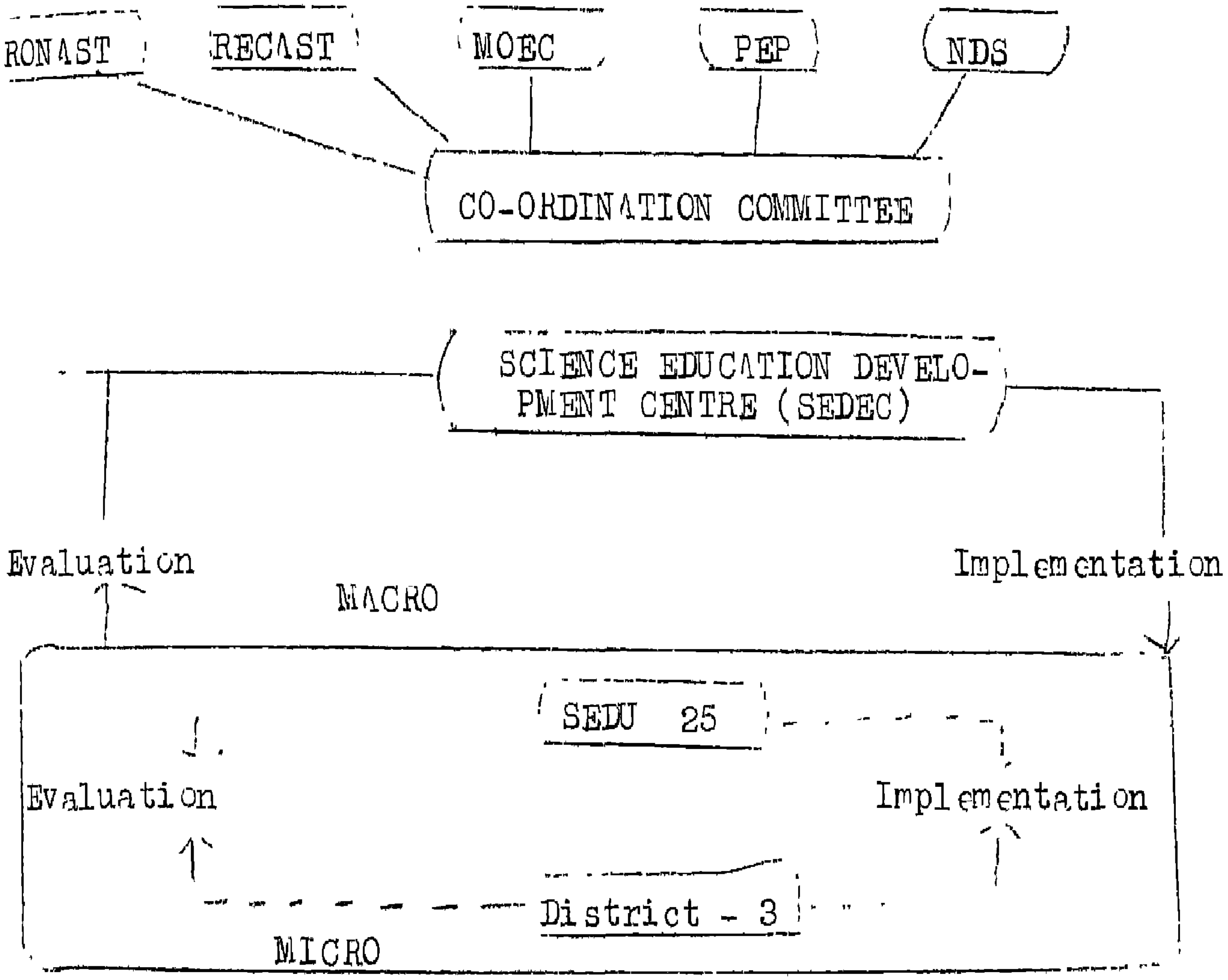
Resource Persons : Persons from all relevant organisations involved in some sort of Out-of-School Science Activities (10)

Participants : Resource persons from Science Education Development Unit.

- Science teachers from some schools
- Members from Education, Ministry Science Education Dev. Centre, Curriculum Development Centre. Total No.(30)

Duration : 6 days

Locations : Kathmandu



RONAST	Royal Nepal Academy of Science and Technology
RECAST	Research Centre for Applied Sc. & Tech..
MOEC	Ministry of Education & Culture
PEP	Primary Education Project
NDS	National Development Service

PHILIPPINES

I. Overview

The Science Promotion Institute of the National Science and Technology Authority is charged with the function of popularizing the concepts of science and technology to the people. One of the programmes undertaken by this institute is the implementation of out-of-school science activities.

II. Planning

A proposal for training key-personnel will be submitted. In this proposal, the following steps will be taken.

1. Constituting a steering committee having representatives from NSTA, Ministry of Education Culture and Adults,(M-ECS), National Management and Youth Centre (NMYC), National Economic and Development Authority (NEDA), The Ministry of Local Government (MLG) and the NSTA Regional Office..
2. Discussion of resources, funding agencies, coordination strategies and linkage aspects.
3. Communication to relevant agencies
4. Formulation of the statement of budget

III. Implementation

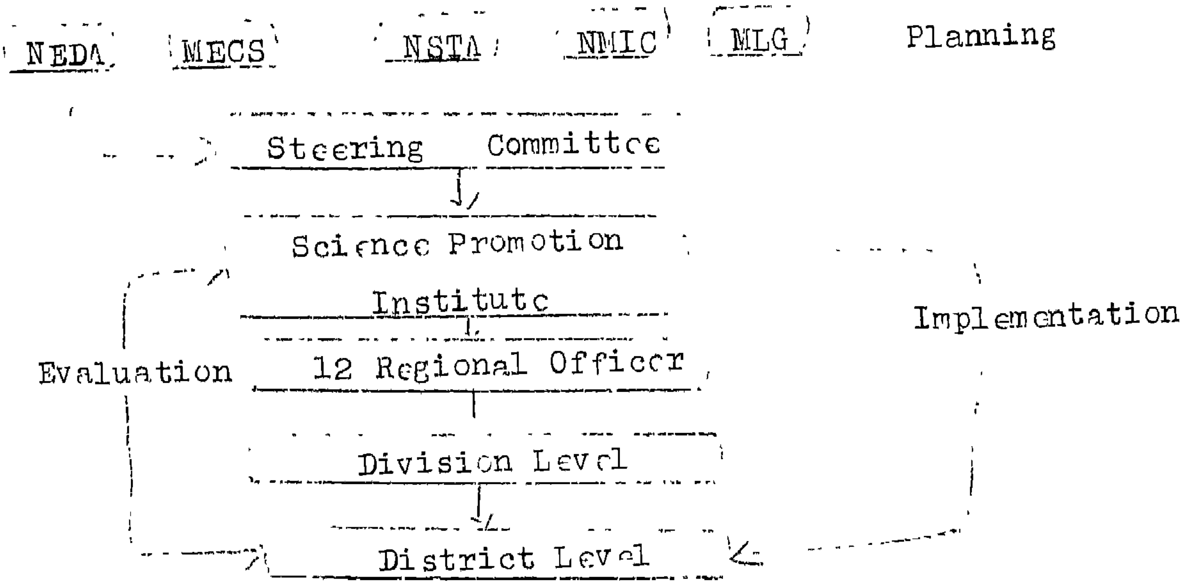
The Science Promotion Institute will implement this project. All science promotion officers from the region of the country will be the participating in the seminar/workshop to be held for 7 days

at the national level in the first quarter of 1987. Resource persons, venues and other arrangements will be done. The workshop will include various methodologies such as lectures, discussion group session and practical activities, visits to museums, libraries and other agencies who have similar programmes.

The regional office of the NSTA will hold similar training at their respective regions. If funds are available, similar programmes will be held at the provincial/district level.

IV. Evaluation

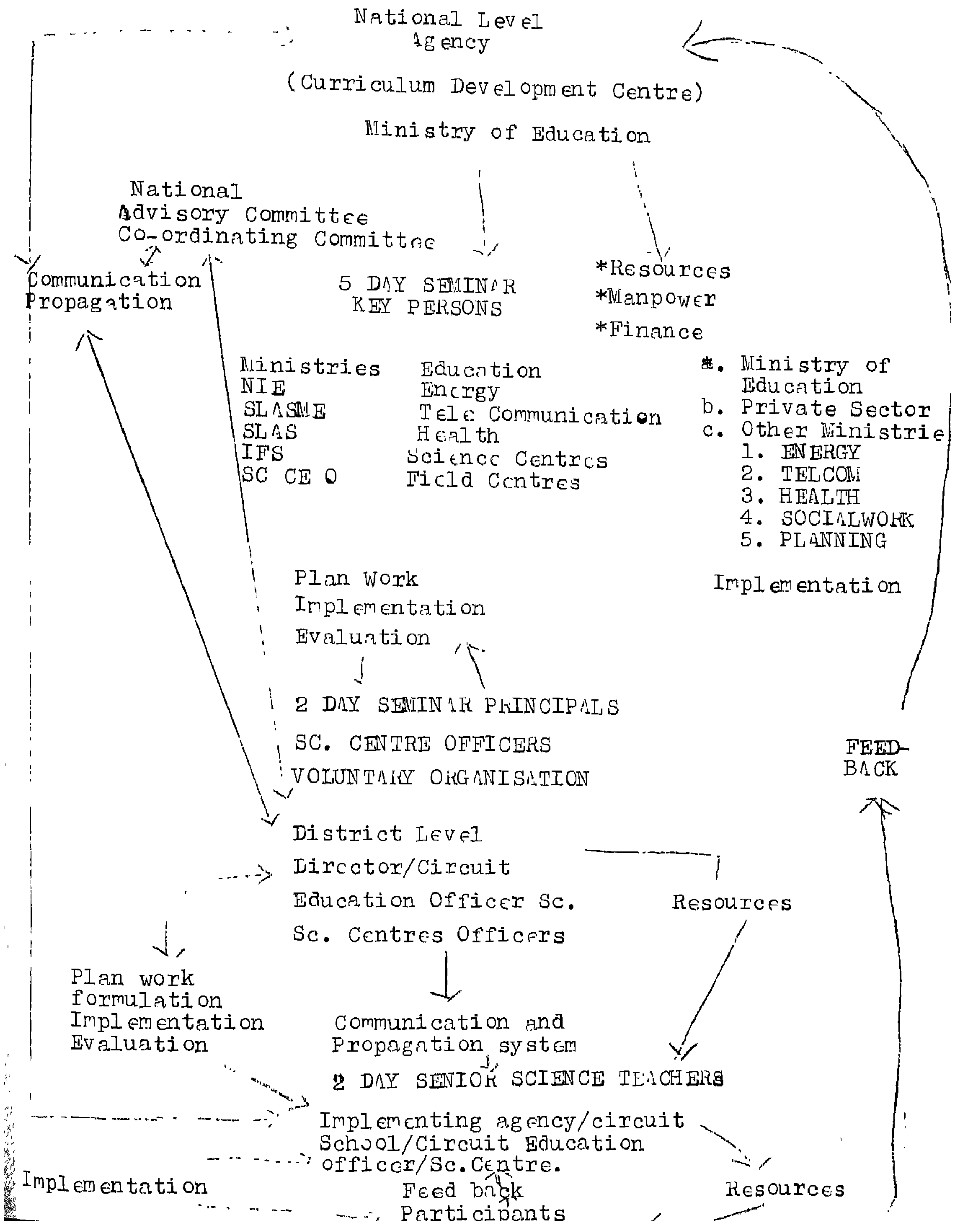
The Content - Input-Process-Product Model of evaluation will be used.



Objectives

1. To acquaint the key implementor of OSSA of the technique of planning, implementation and evaluation through the use of the training manual.
2. To train the key implementors to implement OSSA in all regions of the country.

SRILANKA

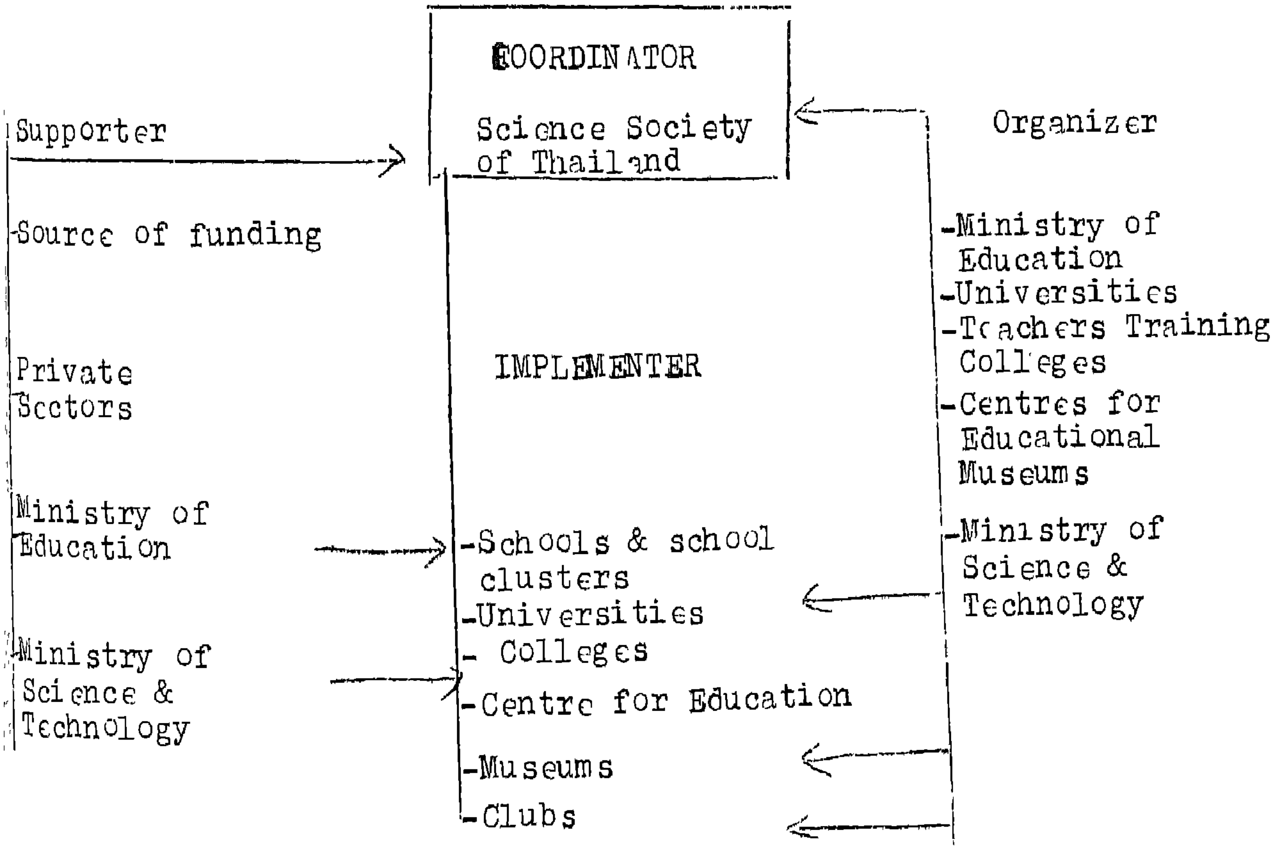

National Level Agency
(Curriculum Development Centre)
Ministry of Education
National Advisory Committee
Co-ordinating Committee
Communication Propagation
5 DAY SEMINAR KEY PERSONS
*Resources
*Manpower
*Finance
Ministries
NIE
SLASME
SLAS
IFS
SC CE O
Education
Energy
Tele Communication
Health
Science Centres
Field Centres
a. Ministry of Education
b. Private Sector
c. Other Ministrie
1. ENERGY
2. TELCOM
3. HEALTH
4. SOCIALWORK
5. PLANNING
Implementation
Plan Work
Implementation
Evaluation
2 DAY SEMINAR PRINCIPALS
SC. CENTRE OFFICERS
VOLUNTARY ORGANISATION
FEED-BACK
District Level
Director/Circuit
Education Officer Sc.
Sc. Centres Officers
Resources
Plan work
formulation
Implementation
Evaluation
Communication and
Propagation system
2 DAY SENIOR SCIENCE TEACHERS
Implementing agency/circuit
School/Circuit Education
officer/Sc.Centre.
Implementation
Feed back
Participants
Resources

THAILAND

Thailand has been planning to run a national workshop on Out-of-School Scientific Activities for key personnel in December 1986. The major costs for key personnel will be borne by the Ministry of Education, the cost for resource persons may be borne by the Unesco. In this respect the Handbook developed in New Delhi, [illegible] India. October 1986 will be used as a guideline for producing modified guide books and other papers for the training programmes.

The trained personnel, last of all, will conduct the OSSA in their own regions and become resource persons for the regions.

Organizing Chart of the Out-of-School Scientific Activities in the National Science Week



CHAPTER - 5

Hands on Experiences of Out-of-School Science Activities

The group felt in view of the diverse backgrounds of the participants a few hands on experiences would be useful. Two such were organised - a field trip and planning of discovery boxes. Summary of the activities are presented below. Details would be included in the Training handbook at appropriate places.

Examples of Field Trips

It was decided that a practical exercise in holding a field trip would be helpful. The site chosen was a city park with Lodi tombs, as it was felt most cities, in most countries would have a similar public park with historical monuments in it. Delegates discussed in broad terms the planning, implementation and evaluation of the field trip, leaving freedom for the exercise of imagination in the development of creative activities. The delegates were divided into small groups and each prepared an activity as shown below. As you will see these were diverse and do show tht field trips can produce a variety of activities.

Identifying Trees - Mr. Karki (Nepal), Prof. Ala (Bangladesh) & Dr. P.K. Khanna.

Study of a Plant - Mr.Premaratne (Sri Lanka), Mr.Boomreong (Thailand) and Dr. J. Tanaka.

Observing the park - Mr. Kim Jin Kyu (Korea), Miss Chen Yan (China) and Dr. Man Mohan Singh.

Describing Trees - Mrs.Amerila (Philippines), Mr.Bach (Vietnam) and Mrs. Sonal Mehta.

Visitors Reactions to the park	- Mr. Pandey (India), Mr.Pasaribu (Indonesia) and Miss Patricia McDonald.
Mathematics studying Geometrical shapes of Lodi Tombs	- Mr.Ibrahim Noh (Malaysia) &Dr.(Mrs)Suman Bala Malik and Dr.(Mrs.)S.Bhattacharya.

The report of each group were discussed in a general session.

Examples of Discovery Boxes

Very simple a Discovery Box is a bod of related objects, with questions about them. The Discovery Box concept may be used both inside and out side class room situation broadly to :

- Provide interactive experience to participants
- Interest them to learn through involvement and a sense of joy
- Provide opportunity for wider groups to interact with each other.
- Provide scope and flexibility to the organisers to accommodate cultural physical and natural variations.

Cardinally, such an activity as Discovery Box, or exercise, as per the views of the authors states that the performance of identification using any one or more of the senses recall and associating the characteristics with scientific concepts could be stated as discovery. Thus the major objectives other than the coll-abial benefits of such an activity can be :

- To help the participants to observe special characteristics of features.

- To name these observations
- To compre the characteristics and feature with other given objects.
- To help the participants to identify common features.
- To similarity
- To develop the skill of recording and analysing.

The specific objectives relted to specific activity outcome may be fixed by the activity organisers who will plan the activity, its working methodology and the evaluation procedures

Some suggestions which could be kept in mind while developing the discovery boxes are :

1. Specific objectives with some openness may be clearly spelled out
2. Target group for which activity box is designed
3. How many participants may be able to use the same at one time
4. Average time required for doing the activity
5. What are relevant placement considerations where to use and how to use.
6. Wht materials, objects are required.
7. The activities may start and with certain questions. Answers can be given later.
8. Such boxes or activities should be so planned to give scope for divergent thinking.
9. Observers, participants, and the organisers should be involved to give Feedback.

10. Feedback should be collected for all aspects right from the planning, execution, process of activity and outcome rather than confining to only participants' performance.

11. Activity should need to have work for all

Discovery Box

All the participants from different countries were divided in groups, who after group work planned for following Discovery boxes.

1. Feet box

Feet of animals like vows, horse, cat, dog, frog, lizard, birds etc.

2. Mirrors box - various kinds of mirrors
3. Amphibians Box - Animals belonging to amphibians group
4. Geometrical shapes of different colours box
5. Animals made up of different materials, colours and sizes box.

CHAPTER - 6

Recommendations of the Workshop

Based on its deliberations and discussions, the worksh made the following suggestions for further developing regio cooperation and National Action in the field of Out-of-Scho science activities and extension work for youth.

For Unesco

1. There should be follow-up Regional Workshops in different countries in South and East Asia and the Pacific area to review the progress of the training programmes and their impact on OSSA in member countr

2. Unesco should urge strongly the Governments of membe countries to initiate the implementation of the works recommendations.

3. Similar workshop on Out-of-School Science Activities and Extension work for Young People at the National level should be funded for other member countries by the Unesco since Indonesia, Malayasia and Phillippin have been offered such funds.

4. Unesco should in the coming years stress more on OSS for pre-school children and Out-of-School youth and adults.

5. Unesco may investigate incorporation of OSSA as a special component in teachers training syllabuses fo

pre-service and in-service teacher training courses, as well as the development of a special OSSA course for in-service teachers.

6. Unesco may investigate development of OSSA activities based on low cost local resources.

7. Unesco should set up an Information and Documentation Centre in this region for OSSA for the benefit of member countries.

On the National Level

1. There should be try-out of the material on a pilot basis before adapting these for national implementation.

2. For the country not using English the materials should be translated into the local language.

3. National Governments should be requested to give priority for OSSA in their national development programmes and allocate adequate resource for this.

4. There should be frequent communications by way of newsletters, bulletins etc. between and among nations.in South and East Asia and Pacific region for exchange of ideas, trends and project results.

5. Special measure should be taken to induct the non-governmental organisations (NGOs) so as to involve them in OSSA.

6. National Governments are requested to involve closely the State and local agencies in their planning for OSSA, to take advantage of feedback from the grass roots level, or to have major planning take place at the State or provincial level with a national co-ordinating and advisory body.

Annexure - I

LIST OF PARTICIPANTS

1. Bangladesh

Prof. S.M. Daman Ala
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Equipment Board,
Mirpur,
Dhaka.

2. China

Miss Chen Yan
Physics Teacher,
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West City District
Beijing.

3. India

Dr. M.M. Pandey
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4. Indonesia

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5. Korea

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6. Malaysia

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7. Nepal

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8. Phillipines

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National Science and Technology
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Metro Manila.

9. Sri Lanka

Mr. V.A. Premaratne
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Science Education Support Centre,
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10. Thailand

Mr. Boonreong Keosard
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11. Socialist Republic of Vietnam.

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RESOURCE PERSONS

12. Australia

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13. India

1. Shri R. Joshi
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2. Prof. P.K. Khanna
Head of the Department of Science
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3. Dr.(Mrs.) Suman Bala Malik,
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4. Ms. Sonal Mehta
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5. Dr. Man Mohan Singh
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14. Japan

Dr. Jiro Tanaka
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15.	Programme Director	Prof. B. Ganguly, Head, Deptt. of Education in Science and Mathematics, NCERT, Sri Aurobindo Marg, New Delhi - 110 016.
16.	Programme Coordinator	Dr.(Mrs.) S. Bhattacharya, Reader, Deptt. of Education in Science and Mathematics, NCERT, Sri Aurobindo Marg, New Delhi - 110 016.
17.	Unesco	Mr. M.A. Qureshi Specialist in Technical and Vocational Education, Unesco ROEAP Bangkok, Thailand 10110

Annexure II

AGENDA

1. Opening of the Workshop.

2. Election of the Officers of the Workshop

3. Consideration of the Agenda and Provisional Schedule of Work

4. Review, analysis and synthesis of current experiences of out-of-school scientific activities by young people in the Region.

5. Presentation of salient features of the training handbook for organising of out-of-school scientific activities and extension work programmes with special reference to:

   (a) Planning for out-of-school activities

   (b) Implementing out-of-school activities

   (c) Evaluating out-of-school activities

   (d) Special characteristics of selected out-of-school activities.

6. Consideration and development of outlines of follow-up national training programmes of out-of-school scientific activities and extension work programmes.

7. Consideration and adoption of the draft report.

8. Closing ceremony.

ANNEXURE - III

PROGRAMME

VENUE : Conference Hall, New Library Building.

WEDNESDAY 15.10.86	9.00 - 10.15	Registration
	11.30 - 11.30	Inauguration
	11.30 - 12.00	Coffee Break
	12.00 - 1.00	Discussion on Agenda Electior of office bearers and formation of groups.
	1.00 - 2.00	Lunch Break
	2.00 - 3.30	Presentation of Status reports by participants from Bangladesh, Indonesia.
	3.30 - 3.45	Coffee Break
	3.45 - 5.00	Presentation of Status reports by participants Malaysia and Nepal.
THURSDAY 16.10.86	9.00 - 11.30	Presentation of Status reports by participants from Phillipines Rep. of Korea, Sri Lanka, Soc. Rep.of Vietnam, Thailand.

	11.30	12.00	Presentation of status reports by participants from India and China
	12.00	1.00	
	1.00	2.00	Lunch Break
	2.00	3.30	Out of -School Science Activities at the Australian Museum, Sydney- Miss Patricia McDonald.
	3.45	5.00	Overview of out-of. School Scientific Activities - Prof. B. Ganguly
FRIDAY 17-10-86	9.00	10.00	Planning of out-of-School Activities - Mr. R. Joshi
	10.00	11.00	Group Discussion on overview and planning of out-of-School Activities
	11.00	11.30	Coffee Break
	11.30	1.00	Group Discussion (contd.)
	1.00	2.00	Lunch Break
	2.00	3.30	Implementation of out-of-school activities-Dr.(Mrs.) S. Bhattacharya
	3.30	3.45	Coffee Break
	3.45	5.00	Group Discussion on Implementation of out-of-School Activities
SATURDAY 18-10-86	9.00	11.00	Group Discussion (Contd.)
	11.00	11.30	Coffee Break
	11.30	1.00	Presentation of Group Reports
	1.00	2.00	Lunch Break
	2.00	5.00	Visit to Natural History Museum.

SUNDAY 19-10-86		Field trip.
MONDAY 20-10-86	9.00 - 10.00	Presentation of group report on planning
	10.00 - 11.00	Evaluation of out-of-School activities Dr. Man Mohan Singh
	11.00 - 11.30	Coffee Break
	11.30 - 1.00	Group Discussion on Evaluation.
	1.00 - 2.00	Lunch Break
	2.00- 3.30	Science Education Activit for Youth in Japan - Dr. Jiro Tanaka
	3.30 - 3.45	Coffee Break
	3.45 - 5.00	Group Discussion on Evaluation contd. followe by Finalization of National Programmes by participants.
TUESDAY 21-10-86	9.00 - 11.00	Presentation of National programmes in brief
	11.00 - 11.30	Coffee Break
	11.30 - 1.00	General Discussion on out-of-School Activities
	1.00 - 2.00	Lunch
	2.00 - 3.00	Planning for the field studies Lodhi Gardens- Miss P. MacDonald
	3.00 - 3.30	Coffee Break
	3.30 - 5.30	Trip to Lodhi Garden

WEDNESDAY 22-10-86	9.00 - 11.00	Group work on trip to Lodhi Garden.
	11.00 - 11-30	Coffee Break
	11.30 - 1.00	Evaluation of the trip and presentation of report
	1.00 - 2.00	Lunch Break
	2.00 - 3.30	Planning & Discovery box (2 per group)
	3.30 - 3.45	Coffee Break
	3.45 - 5.00	Presentation of the discovery Box and its evaluation.
THURSDAY 23-10-86	9-00 - 10.00	Organisation of Science Club;
	10.00 - 11.00	Presentation of Science Club Took Kit and the Salient features Training Programmes.
	11.00 - 11.30	Coffee Break
	11.30 - 1.00	
	1.00 - 2.00	Lunch Break
	2.00 - 3.30	Discussion and finalisation of recommendations.
	3.30 - 5.00	
FRIDAY 24;10-86	9.00- 10-30	Plenary session-Presentation of Workshop Report, Drafting and Finalization of resolutions/recommended follow up action.
	11.00 - 12.30	Valedictory Session.

Annexure IV

CONSTITUTION OF GROUPS

Group-I

(1) Chairman	Mr Ibrahim Noh
(2) Rapporteur	Mr Boonreong Keosard
(3) Members	Mr John Pasaribu
	Miss Chen Yan
(4) Resource person	Dr. P.K. Khanna

Group-II

(1) Chairman	Mr Kim-Jinbyu
(2) Rapporteur	Mrs. Anne Amerila
(3) Members	Mr Ngyuen Huu Bach
(4) Resource person	Dr. Man Mohan Singh
	Dr. Jiro Tanaka

Group-III

(1) Chairman	Mr. Toran B. Karki
(2) Rapporteur	Mr. U.A. Premaratna
(3) Members	Prof. S.M. Daman Ala
	Dr. M.M. Panday (
(4) Resource Persons	Miss Patricia McDonald
	Mrs. Sonal Mehta

APPENDIX -1

Inaugural Address
by
M.M.Chaudhri, Joint Director
CIET, NCERT

Mr. Derkatch and Mr. Qureshi of Unesco, Prof. Ganguly and Mrs. Bhattacharya from DESM, NCERT, Resource persons from Japan, Australia and India, Participants from member countries of Asia and Pacific, colleagues from NCERT, ladies and gentlemen. It gives me great pleasure to welcome you on behalf of NCERT and myself to this Unesco-APEID Workshop concerned with out-of-school scientific activities by young people.

In any communication or teaching-learning process, there could be one or more of the following objectives; to entertain to inform, to give knowledge, to provide skills, to provoke thinking, to encourage problem solving, to provoke action and creativity. In my experience I find that as we go down the above list, the communication or teaching-learning process becomes more and more difficult. For example, it is easier to inform than to provoke thinking which in turn is easier than to provoke action or creativity to solve a problem.

Learning of science does not come merely through information or knowledge. Understanding in an individual comes in doing it through exploration and experiments. The schools and museum in the early part of this century were concerned in teaching science through books, demonstration and exhibitions. As we came to know the psychology of learning, we began to

realise that science must be done both at school as well as in the museums. Frank oppenheimer collected the various disposal material of world War II to build EXPLORATARIUM in San Francisco where exhibitions could be manipulated by children to see, hear, feel and discover the wonders of science.

Developing countries in Asia and elsewhere are plagued with lack of resources in schools and large drop out of children. In this context, therefore, the material from the environment, the low cost experiments, puzzles and games made with local technology, assume significance not realized earlier. For such a movement to gather momentum the teachers have to be given knowledge and skill to do science with the children. Unesco has been all long encouraging this development. The two resources - books of science experiments and several publications on low cost material published by APEID in Bangkok bear testimony to their concern for the dissemination of science in the developing world. For Science and Technology need not remain confined to the elite. It must reach the common child, the out-of-school youth.

Innovators in our own country felt this shortcoming in the sixties. Vikram Sarabhai, father of space age in India, gave birth to the concept of Community Science Centre in Ahmedabad where book library, laboratory, media, exhibition,

games and puzzles (and now Computer) were made available at one place for children, parents and teachers in an interactive way. This set in motion other innovators. We saw the emergence of Kishore Bharati, Kerala Shastra Sahitya Parishad, Eklavya and many others who organised camps, **processions**, skits to develop materials in the form of books, A-V shows, low cost materials and experiments to reach in and out of school children. And there is a search for new forms appropriate for the age and the socio-economic group.

The Government of India has recognised the imperatives in this area to launch a massive teacher training programme as well as a programme of Operation Blackboard and District Resource Centres. One of the most challenging programme of utilization of mass-media (TV and Radio) through Indian Satellite INSAT, has been undertaken to reach children and youth with broad educational goals as well to create scientific temper. How does one relate science to their environment? How does one make programmes to provoke enquiry and creativity through Television ? How does one make Television and Radio, a one way media, into an interactive media ? These are some of the questions confronting us in Central Institute of Educational Technology at a time when technology is at our door step. Will we be able to create the exciting software indigenously ? Will we be able to provide continued access to TV and Radio to children in a community situation. Or

will we be swamped by the glamour of entertainment and advertising in media ? Only time will tell.

Your workshop is to train the key persons in the out-of-school scientific activities of young persons. Very often we have seen that everybody trains everybody to do something from international level to national to state to district level but nobody does it. The action, the creativity is supposed to emerge somewhere along the line but somehow eludes us. It is because the trainers are not doers and doers are not trainers and that ethos passes down the line. I sincerely hope that this would not be the case with this programme where a manual has already been developed and we would see the innovative ideas emerging out of this programme which would be of practical use for the Asian countries.

I would like to wish the Workshop success and thank Dr. Ganguly for inviting me even though at the last minute (!) to share some of my hurriedly organised thoughts. Thank you all for giving me a patient hearing.

APPENDIX - II

Valedictory Address
of
Dr. S.M. Nair, Director
National Museum of Natural History
New Delhi

Prof. Ganguly, Mr. Ibrahim, Dr. Bhattacharya and participants, it is an honour and privilege to come and speak to you. I have been given this honour and privilege may be because I run and out-of-school activities through the museum. As you have much experience and have worked with these activities for a long time, my saying anything to you I feel will be like bringing coal to Newcastle. However, I am placing some views based upon my experiences in museums, that is out-of-school activity through the museum.

We all know that science is a pursuit of learning. It cannot be confined to the classroom. All ways and means to utilise every opportunity to learn through out-of-school activity must be explored. Media, Television, Zoos and beyond that nature and environment which is present everywhere on earth offers the most important opportunity to learn. Instead of confining learning to the classroom one must explore the tremendous opportunity that exists outside in our own back-yard, school campuses, National Parks, Sanctuaries and in every city. Nature can be used very fruitfully in teaching-learning activities. Presently in schools, biology is taught only in the classrooms, even the school lawns are not used for it.

Any place where natural things are in abundance can be used for teaching biology. People visit National Parks and Sanctuaries to see a tiger or lion or any particular species. They come back frustrated if they cannot do so. Opportunities of being with and understanding nature is lost due to the approach. It needs proper approach and development of materials for interpretating nature if National Parks and Sanctuaries are to be utilised successfully for education.

A large number of projects can be considered for the successful utilization of nature e.g. a tree can be used as an ecosystem. With all its biological activities, it provides a very good model.

Small collections like leaf, stones, flowers etc., are also valuable as teaching aids, but one must emphasize that collection must be made without harming nature. Man's role in degradation of nature has been over emphasized. It must be stressed, that though man is responsible for environmental degradation, man is also a capable animal. He is not only capable of understanding the problems but is also capable of taking action to tackle the problem.

It is also possible to utilise nature in the formal classroom setting. For instance, one can start teaching photosynthesis by bringing a leaf into the class and drawing attention of the child to its shape, colour, functions etc. One can go on the

talk about uses of leaf in particular and uses of plants in general. The child is thus made to understand how he is related with the day to day environment. He can for instance be told that trees are cut down to produce paper and the discussion can lead to use and misuse of paper. The child can be made conscious of using paper more carefully. Similarly the child may be made aware of misuse of electricity. However one needs to be very careful about the picture one paints of the future world. Instead of giving the pessimistic view that man will ultimately not able to survive due to destruction of his environment, the child should be told that men can and do conserve the environment. Thus how to reduce the misuse of various naturally available resources should get emphasis in our curriculum.

There is also a lack of coordination between the various subjects being taught in school. For instance in a particular school the children learnt about the deluge and Noah's ark in the theology class and about the extinction of Dinosaurs in the biology class. When asked in the examination as to why dinosaurs became extinct, one child answered "because they were too big to get into the Noah's ark". These sort of situations commonly arise in the classroom.

Secondly we should not underestimate the comprehension level of the child. I remember a story about a little child who

asked his mother where she came from ? And the mother gave a very complicated answer involve angels and fairies. The child continued with his questions and asked where his grandmother and great grandmother came from?.The mother gave a similar answer. Finally the child asked "You mean mother that there has been no sexual reproduction in our family for so many generations?". So we must remember not to underestimate the comprehension level of children. They know much more than we give them credit for.

I am glad that the NCERT has realised the need and importance of the non-formal out of school activities as complementary to the formal education system. I thank them for giving me this valuable opportunity of being with you, and sharing some of my ideas.